



# Assessment of Radiofrequency Microwave Radiation Emissions from Smart Meters

Sage Associates  
Santa Barbara, CA  
USA

## **INTRODUCTION**

### **How Smart Meters Work**

This report is limited to a very simple overview of how smart meters work, and the other parts of the communication system that are required for them to transmit information on energy usage within a home or other building. The reader can find more detailed information on smart meter and smart grid technology from numerous sources available on the Internet.

Often called ‘advanced metering infrastructure or AMI’, smart meters are a part of an overall system that includes a) a mesh network or series of wireless antennas at the neighborhood level to collect and transmit wireless information from all the smart meters in that area back to a utility.

The mesh network (sometimes called a distributed antenna system) requires wireless antennas to be located throughout neighborhoods in close proximity to where smart meters will be placed. Often, a municipality will receive a hundred or more individual applications for new cellular antenna service, which is specifically to serve smart meter technology needs. The communication network needed to serve smart meters is typically separate from existing cellular and data transmission antennas (cell tower antennas). The mesh network (or DAS) antennas are often utility-pole mounted. This part of the system can spread hundreds of new wireless antennas throughout neighborhoods.

Smart meters are a new type electrical meter that will measure your energy usage, like the old ones do now. But, it will send the information back to the utility by wireless signal (radiofrequency/microwave radiation signal) instead of having a

utility meter reader come to the property and manually do the monthly electric service reading. So, smart meters are replacements for the older ‘spinning dial’ or analog electric meters. Smart meters are not optional, and utilities are installing them even where occupants do not want them.

In order for smart meters to monitor and control energy usage via this wireless communication system, the consumer must be willing to install power transmitters inside the home. This is the third part of the system and involves placing power transmitters (radiofrequency/microwave radiation emitting devices) within the home on each appliance. A power transmitter is required to measure the energy use of individual appliances (e.g., washing machines, clothes dryers, dishwashers, etc) and it will send information via wireless radiofrequency signal back to the smart meter. Each power transmitter handles a separate appliance. A typical kitchen and laundry may have a dozen power transmitters in total. If power transmitters are not installed by the homeowner, or otherwise mandated on consumers via federal legislation requiring all new appliances to have power transmitters built into them, then there may be little or no energy reporting nor energy savings.

Smart meters could also be installed that would operate by wired, rather than wireless means. Shielded cable, such as is available for cable modem (wired internet connection) could connect smart meters to utilities. However, it is not easy to see the solution to transmit signals from power transmitters (energy use for each appliance) back to the utility.

Collector meters are a special type of smart meter that can serve to collect the radiofrequency/microwave radiation signals from many surrounding buildings and

send them back to the utility. Collector meters are intended to collect and re-transmit radiofrequency information for somewhere between 500-5000 homes or buildings. They have three operating antennas compared to two antennas in regular smart meters. Their radiofrequency microwave emissions are higher and they send wireless signal much more frequently. Collector meters can be placed on a home or other building like smart meters, and there is presently no way to know which a homeowner or property owner might receive.

### **Mandate**

The California Public Utilities Commission has authorized California's investor-owned utilities (including Pacific Gas & Electric, Southern California Edison Company and San Diego Gas & Electric) to install more than 10 million new wireless\* smart meters in California, replacing existing electric meters as part of the federal SmartGrid program.

The goal is to provide a new residential energy management tool. It is intended to reduce energy consumption by providing computerized information to customers about what their energy usage is and how they might reduce it by running appliances during 'off-time' or 'lower load' conditions. Presumably this will save utilities from having to build new facilities for peak load demand. Utilities will install a new smart meter on every building to which electrical service is provided now. In Southern California, that is about 5 million smart meters in three years for a cost of around \$1.6 billion dollars. In northern California, Pacific Gas & Electric is slated to install millions of meters at a cost of more than \$2.2 billion dollars. If consumers decide to join the program (so that appliances can report energy

usage to the utility), they can be informed about using energy during off-use or low-use periods, but only if consumers also agree to install additional wireless power transmitters on appliances inside the home. Each power transmitter is an additional source of pulsed RF that produces high exposures at close range in occupied space within the home.

*“Proponents of smart meters say that when these meters are teamed up with an in-home display that shows current energy usage, as well as a communicating thermostat and software that harvest and analyze that information, consumers can see how much consumption drives cost -- and will consume less as a result. Utilities are spending billions of dollars outfitting homes and businesses with the devices, which wirelessly send information about electricity use to utility billing departments and could help consumers control energy use.”*

Wall Street Journal, April 29, 2009.

The smart meter program is also a tool for load-shedding during heavy electrical use periods by turning utility meters off remotely, and for reducing the need for utility employees to read meter data in the field.

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***The above is the best description of Smart Meters and the Smart Grid that we have seen. This is an excerpt from a much longer paper available here: <http://sagereports.com/smart-meter-rf/>. Please note: In this paper the assertion is made that Smart Meters may expose people to levels of radiation that exceed the FCC’s exposure limits. This assertion is based on an assumption of 100% duty cycle (i.e., that the meters are broadcasting all of the time). In the real world, this is not accurate. The reason that Smart Meters are causing so much harm is not necessarily related to the amount of power they put out. We cannot emphasize too strongly that the FCC’s exposure limits have no validity. These limits only prevent thermal (heating) injury. Non-thermal effects are not necessarily related to power levels.***